

Key Terms

- Biomass
- Ethanol
- Landfill
- Methane
- Methanol
- Renewable

Biomass Facts

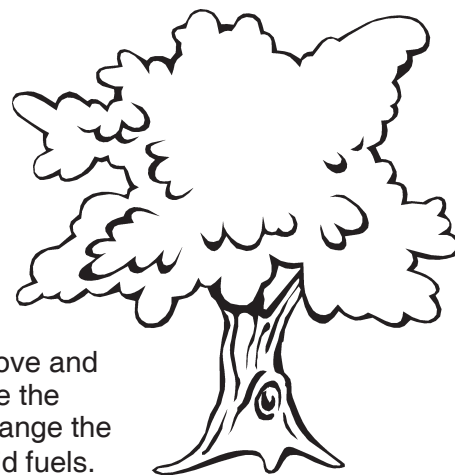
- In 2000, about 44 percent of all renewable energy consumed in the United States came from biomass.
- Biomass can be used to generate electricity with the same equipment or power plants that are now burning fossil fuels.
- Biomass is an important source of energy and the most important fuel worldwide after coal, oil and natural gas.
- In countries like Finland, the United States and Sweden, the per capita biomass energy used is higher than it is in India, China or Asia.

Biomass

What is biomass?

Biomass is anything that is alive. It is anything that was alive a short time ago. Trees, crops, garbage and animal waste are all biomass.

Biomass gets its energy from the sun. Plants store the sun's energy in their leaves and roots. When we eat biomass, we use the energy to move and grow. When we burn biomass, we use the energy to make heat. We also can change the energy in biomass – into gas and liquid fuels.



Biomass is renewable.

Biomass energy is *renewable*. That means we can make more. We can always grow more plants. We should plant trees after we cut trees down. We need to take care of the soil, however, in which our crops grow.

We use biomass everyday.

People and animals get their energy from biomass. The energy in everything we eat comes from plants.

Until about 150 years ago, biomass gave people most of the energy they used. The cave dwellers and settlers burned wood for heat. They burned wood to cook food. In many poor countries, wood is still used for most energy needs. People also burn corn cobs and straw. In places without trees, people burn the waste from cows and pigs.

Biomass can make electricity.

Biomass can be used to make electricity. Many towns burn their garbage in waste-to-energy plants. Instead of putting garbage in *landfills*, it is burned to make electricity. This saves landfill space.

Burning biomass doesn't cause as much pollution as burning coal or oil. But, many people don't like to burn waste near their towns. It can smell bad!

Wood and Other Biofuels

Biofuels have their origin in plants. During photosynthesis, the sun's energy is turned into biomass - chemical potential energy. Biomass can be used as it is, turned into a gas or processed into fuels such as methane, ethanol or methanol.

Wood

Wood is one of the most plentiful forms of biomass. More than 30 percent of the earth is covered by trees. Wood itself accounts for more than 80 percent of the biomass fuels used in the United States.

Wood was once our chief source of energy. From the time of the caveman it has been used as fuel. People learned that burning wood could be used to keep warm, ward off animals, light up the darkness and cook food. Wood became the basis for early civilization. Wood was the main source of energy in the U.S. until the early 1900s. The use of fossil fuels as an energy source abruptly put an end to wood's popularity. The ease with which fossil fuels could be used made wood seem old fashioned.

The one economic sector that still makes use of wood energy is industry. The paper and lumber producing industries together account for almost all of the wood energy used today. Both of these industries use wood waste for steam, heat and to produce electricity.

Methane and Methanol

Biomass can be used to make a gas called *methane*. Methane is like the natural gas we use in our stoves and furnaces.

In China, many farmers use all their garbage, even human waste, to make methane. They use the gas to cook food and light their homes. The ashes that are left can be used as fertilizer.

When crude oil, natural gas and coal are heated they let off *methanol* and *ethanol*. Methanol can also be obtained by gasifying wood. Methanol can be used as a transportation fuel.

Ethanol

Biomass can also be turned into a fuel-like gasoline. Just as apples can be made into cider, corn and grains can be made into *ethanol*. Ethanol is made by *fermenting* corn or grains like sorghum, barley and oats. Fermentation involves turning the starch in the corn or grains into sugar.

Ethanol is frequently added to gasoline to form *gasohol*. Ethanol costs more than gasoline to use but it is cleaner and it is also renewable.

Biomass and the Environment

Biomass can pollute the air when it is burned, though not as much as fossil fuels. Growing plants from biomass fuel may reduce greenhouse gases, since plants use carbon dioxide and produce oxygen as they grow.



This fact sheet is a supplement to the Energy 2 Learn/E2IQ program and are targeted toward fifth- and sixth-grade students. Readers are encouraged to reproduce this material. For more information, about energy resources and conservation, call 1-800-851-8899 or visit www.energy.sc.gov. For information about solid waste issues, please call 1-800-768-7348 or visit www.scdhec.gov/recycle. Energy 2 Learn is a partnership of the S.C. Energy Office and DHEC's Office of Solid Waste Reduction and Recycling. This fact sheet was prepared with the support of the U.S. Department of Energy (DOE), Grant No. DE-FG44-00R410766, State Energy Program, administered by the South Carolina Energy Office. However, any opinions, conclusions, or recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the DOE.